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ABSTRACT

This module is one in a series of six designed to help vocational educators develop skills needed to make use of the Vocational Technical Education Consortium of States materials and to develop and manage individualized instructional programs. Recommended for use by both pre- and inservice teachers and curriculum development specialist interns, the modules should help them institutionalize performance-based vocational education. The objective of this module is to help develop skill in developing modules for individualized instruction. Focuses are components considered essential to include in a module and the process to follow to develop an effective module. Contents include five learning experiences based on four enabling objectives. A list of outside resources which supplement those contained within the module is presented. Each learning experience contains some or all of the following materials: enabling objective: learning activity (activities), including information sheets, case studies, and self-checks with model answer (as feedback): and optional activity (activities). (YLB)

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DEVELOP A MODULE FOR INDIVIDUALIZED INSTRUCTION

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INTRODUCTION

It is virtually impossible to meet the diverse needs and interests of a group of students through individualized instruction without having appropriate instructional materials. In recent years, this realization has resulted in the emergence of the module as an effective teaching tool.

When used in a properly managed program, the module can promote student learning. In the hands of skillful teachers, modules can be used to serve the needs and interests of each student, even those who have neither ability nor inclination to read.

There are many modules available for use by vocational teachers with some having great potential utility. However, there are certain occupational areas in which no modules have been developed and other areas in which only poorly developed modules exist. For these reasons, a vocational teacher should have module development skills.

This module is designed to prepare you with the ability you will need to develop modules for individualized instruction. You will become aware of the components considered essential to include in a module and the process to follow to develop an effective module.

ABOUT THIS MODULE

Objectives:

Terminal Objective: In an actual school situation, develop a module for individualized instruction. Your performance will be assessed by your Resource Person, using the Teacher Performance Assessment Form, pp. 56-58, (Learning Experience V).

Enabling Objectives:

1. After completing the required reading, demonstrate knowledge of the use of modules in individualized instruction and their essential components.
2. After completing the required reading, demonstrate knowledge of the steps taken to develop a module for individualized instruction.
3. Given a case study describing a hypothetical teacher's first attempt at developing a module, critique that teacher's performance.
4. Given a hypothetical group of students and a module, critique the module's adequacy for the group.

Prerequisites:

To complete this module, you must have a validated Terminal Performance Objective and competency at determining the needs and interests of students and developing Terminal Performance Objectives. If such is not the case, you should demonstrate your competence at the skills in the below listed modules before attempting to meet the terminal objective of this module:

.B1 Determine the Needs and Interests of Students

.X2 Develop Valid Performance Objectives

Resources:

A list of the outside resources which supplement those contained within the module follows. Check with your Resource Person (1) to determine the availability and location of these resources, (2) to locate additional references if needed, and (3) to get assistance in setting up activities with peers or observations of skilled teachers, if necessary. Your Resource Person may also be contacted if you have difficulty with directions, or in assessing your progress at any time.

LEARNING EXPERIENCE I

(Optional)

Reference: Module C18 - "Individualized Instruction" American Association for Vocational Instructional Materials, Athens, Georgia.

LEARNING EXPERIENCE II

(Optional)

References: "Module Development Handbook" and Module Dev-101, "Develop an Instructional Module" The National Center for Research in Vocational Education, Columbus, Ohio.

LEARNING EXPERIENCE III

(Optional)

A teacher experienced in module development or a local curriculum supervisor to discuss module development with.

LEARNING EXPERIENCE IV

(Optional)

Modules, if available, that were prepared for use in your occupational specialty.

LEARNING EXPERIENCE V

(Required)

An actual school situation in which you can develop a module for an existing group of students.

A Resource Person to assess your competence to develop a module for individualized instruction.

LEARNING EXPERIENCE I

OVERVIEW

Enabling Objective: After completing the required reading, demonstrate knowledge of the use of modules in individualized instruction and their essential components.

Activity: You will be reading the information sheet, The Module in an Individualized Program, pp. 7-15.

Optional Activity: You may wish to review the supplementary reference, Module C-18, "Individualized Instruction" pp. 5-18, available through your Resource Person.

Activity: You will be demonstrating knowledge of the use of modules in individualized instruction and their essential components by completing the Self-Check, pp. 16-19.

Feedback: You will be evaluating your competency by comparing your Self-Check responses with the model responses, pp. 20-22.

Activity: This information sheet explains the role of modules in individualized instruction and the essential module components. Read this information sheet keeping in mind the variation among your students and how individualized instruction through the use of modules might better serve student needs.

THE MODULE IN AN INDIVIDUALIZED PROGRAM

Vocational teachers have long recognized the fact that students differ in many ways and, therefore, all will need rather specialized help to make maximum progress toward occupational competence. In recognition of this fact, the typical vocational teacher spends a considerable amount of time offering students individualized help. Much of the success experienced by vocational teachers is directly related to this characteristic of their teaching behavior.

The concept of individualized instruction is a natural extension of what every vocational teacher already does. It recognizes student differences and suggests that when programs are organized differently, student differences can be better addressed. In an individualized program:

1. Each student is treated as a unique learner and has a planned program specifically developed to meet his career goals given his needs, abilities, and learning style.
2. Each student is expected to accept personal responsibility for learning and operate so as to meet personal career goals.
3. The learning environment encourages student activity with students involved in many different types of learning experiences.

4. Student learning experiences involve the use of a great amount of mediated instructional materials with students themselves operating the media equipment needed.

5. Students are not compared to each other but rather against stated performance standards.

6. Teachers rarely function as lecturers or group discussion leaders. In effect, they become learning managers and student helpers.

Experience has shown that it is not possible for one teacher to guide a total class of vocational students through a truly individualized program without the aid of materials specifically designed for this purpose. For this reason, many teachers have become involved in the development of modules to facilitate their instructional program.

Modules are often referred to as learning guides and this latter name is perhaps the best indicator of module purpose. In effect, a module is prepared to guide the student through a number of experiences specifically designed to prepare him/her with the knowledge, attitudes, and ability needed to perform a particular skill. In the case of a vocational education program, an occupation related skill; a task.

Although a well developed module can guide a student through appropriate learning experiences, a module is not a self-instructional tool. The very best module must be used under the direction of a teacher (Resource Person) to have maximum utility. For this reason, modules are often referred to as being directed-self instructional.

Typically the well developed module will call for the user to check with a Resource Person at frequent intervals to receive feedback relative to certain critical points in the learning sequence. Such checks promote interaction between the learner and the Resource Person, a necessary aspect of the human condition, and also provide for learner safety.

In an individualized program, it is very likely that each student will be moving through modules at a very different pace due to their individual differences. In addition, all students could also be working through different modules at the same time. Such being the case, it is obvious that the students will seldom have identical needs at any one point in time. Nonetheless, it is important for the vocational teacher to realize that large group interaction is still needed on occasion. Students must feel that they are a part of a total group working toward employment in a particular field; a field that has characteristics unlike any other. For this reason, it is recommended that group discussion be an integral aspect of an individualized program. Some would recommend that no less than 20 percent of the instructional time be devoted to group activity; perhaps one day a week or part of each class.

Using a Module

For a module to be effective, it must be used appropriately. Essential in module use is how the module is introduced to the learner by the Resource Person. A student should never be allowed to start a module before a conference is held between him/her and the Resource Person.

It is up to the Resource Person to review the terminal objective found in the module with the learner and make sure that an understanding is reached as to the conditions and standards associated with competent performance. In addition, the Resource Person should discuss with the learner the various learning activity options available and help the learner select those most appropriate given personal needs, interests, capabilities, and learning style.

Naturally, the Resource Person must monitor the learners' progress through the module so that essential help is provided when needed. This does not suggest that the Resource Person must be looking over the learners' shoulder constantly but rather that frequent checks can avoid problems in learning.

Essential Module Components

In recent years, vocational teacher education has come to make extensive use of modules and local school personnel have developed some familiarity with modularized instruction. However, the modules used in teacher education will tend to differ in certain respects from those developed for use in local occupational programs. For one thing, teacher education modules rely heavily on the printed word. For another, they are largely self-contained. Such is the case, because the users have fairly well developed reading skills and, thus, are able to profit from what they read.

In contrast, modules developed for use in local occupational programs tend to rely much less on the printed word and seldom are found to be self-contained. Such is reasonable given the great variation between students' reading ability and inclination to read. However, it should be noted, that in certain vocational areas self-contained modules may be considered quite appropriate given the type of student enrolled.

A well developed module has certain components which, if properly developed, assist the learner to develop the skill around which the module is developed. All components must exist and be organized in such a way that the completed module appears well layed-out in a linear fashion. Naturally, a module should be free of errors in spelling and grammer. A discussion of each essential module component follows:

Directions - a module should contain a set of directions which inform the learner exactly how the module might best be used. Since a learner may be starting an individualized program using any one of a number of different modules, each module should have directions included. It should be noted here, that the learner's Resource Person should go over the directions with each learner prior to module use. Such insures no misunderstandings and protects the student with poor reading skills.

Introduction - a module is developed around a specific skill and the learner must know how that skill relates to the other skills to be learned. In addition, the learner must understand the importance of the skill to personal development. Having such an understanding serves to provide the student with learning motivation. Again, the learner's Resource Person may find, on certain occasions, that relating such information in person may be necessary due to a particular students' inability to profit from the printed word.

Objectives - the focus of a module is always on a Terminal Performance Objective which has been selected from those validated by an Occupational Advisory Committee. As such, the terminal objective must always be stated in a module.

In addition, modules should include Enabling Performance Objectives. Such objectives provide the focus for the various learning activities included in a module. In effect, Enabling Objectives differ from Terminal Objectives in that the former centers on learner performance while the latter centers on performance at an occupational task (worker performance).

Here again, the Resource Person may have to inform the learner of the Terminal and Enabling Objectives involved.

Learning Activities - a module must direct students to activities which will help them meet both Enabling and Terminal Objectives. Such activities should be varied to provide for student differences and also be sequenced in such a way that the learners proceed through experiences that provide them with essential information, then through experiences that give them the opportunity to apply the information in a simulated or practice situation, and lastly, to the final experience which has them perform the required skill under actual occupational conditions and according to occupational standards. In effect, a usable module must provide no less than one learning activity per objective.

However, most modules provide for student differences by providing both alternative and optional activities for the students.

The necessity for making alternative experiences available to learners is easily established. Given the fact that students learn in different ways with some having little or no ability to read, providing alternatives to reading is essential. Some non-readers could profit from listening to audio-taped information while others might respond best to a slide-tape presentation or the like. In contrast, some students might find the printed word the most effective media from which to learn. It is up to the module developer to assess the needs and interests of the students to be served and develop activity alternatives that are appropriate.

Some students may wish to become involved in learning activities beyond those absolutely essential to developing competence. They may have a personal need for additional information or practice under varying conditions. For such students needing enrichment, the module developer would be well advised to include one or more optional learning activities.

It would be the Resource Person's responsibility to discuss with each learner starting a module the various alternatives and optional learning experiences available and to help the learner determine the activities in which to become involved.

Resources - A module must include information about the resources that will be needed to participate in each learning activity offered. Such information would allow the learner to determine if the activity requires the use of machines, tools, equipment, and materials or, perhaps, a particular book or instruction sheet. In certain activities, the learner may need nothing other than a peer and in others the Resource Person may be essential to the activity.

It is essential to the learner's progress, that the needed resources be known and that it be determined that all such resources will be available when

needed. Once again, the learner's Resource Person will need to help.

Self-Check - as stated previously, each learning activity serves to help a learner meet an objective. It follows, that there must be some vehicle by which a learner can determine if he or she has sufficiently profited from participating in the experience. The term Self-Check is normally reserved to describe a check on performance on an Enabling Objective although students would be expected to also check personal performance on any terminal performance objective.

It is essential that a Self-Check require learner response that indicates comprehension rather than simple recall. For instance, a Self-Check item that asks a learner why a particular step in a task is performed is superior to one that asks the learner to name the second step taken in performance of a task.

As in many other cases, the Resource Person may have to work with the learner while the Self-Check is being applied.

Self-Check Feedback - it is essential to learning that the students' response to Self-Check items be confirmed immediately. For this reason, a module should include provisions for immediate feedback to the user. Such may be accomplished in written form or be mediated in some way. Perhaps a peer or the Resource Person would provide such feedback.

Given the fact that the Enabling Objective suggests the conditions under which the learner must respond (perform) and the standards involved, it will be obvious to the learner if the objective has been met. If standards are met, the learner would progress toward the terminal objective, if not, alternate or optional learning experiences would be required.

It is important to note that the choice as to whether or not to engage in alternate or optional activities should be made by the learner. Although it might be tempting for the Resource Person to require such student behavior, such would not help students develop a responsibility for their own progress. At most, the Resource Person might suggest appropriate action.

As in other cases, the Resource Person might be required to personally provide certain learners with needed feedback.

Performance Assessment - an important component of a module is its description of the terminal performance assessment procedures. In certain cases, student performance will be assessed against criteria associated with behavior. For example, the process followed to make a sale. In other cases, assessment will be against product criteria. For example, size, shape, color, etc.

Whether product or process criteria are to apply, the terminal objective would state the standard that will apply and the module must explain the procedures that will be followed during the assessment.

Once again, it might be necessary for the Resource Person to review the procedures with a student prior to personal involvement in the assessment activity.

Terminal Performance Feedback - Each learner should be encouraged to assess personal performance against the stated criteria. In addition, the student must receive feedback from his/her Resource Person. An important aspect of a module is that it describes what the student should do to obtain feedback from the Resource Person.

Naturally, it is recommended that the Resource Person discuss his personal assessment of performance as such compares to the student's.

Prerequisites - not every module is focused on a terminal objective that requires prerequisite skills (other Terminal Objectives) but some do. For this reason, it sometimes becomes necessary to list these prerequisite skills in the module. However, be very sure only to include skills that are truly prerequisite to learning the skill in question. Often tasks are very discrete and thus no prerequisite skill is needed.

Preassessment Device - often module developers prepare cognitive instruments to determine if students have the knowledge needed to perform the skill

a module addresses. Given the Self-Checks and terminal performance assessment criteria included in a well developed module, a special preassessment device is really not needed. The Resource Person could readily use module Self-Checks to determine if a student already possesses sufficient cognitive understandings and the performance assessment criteria to determine skill competence. Therefore, it is not recommended that a special preassessment device be included with a module.

Optional Activity: ⇨ For further information related to individualized instruction, you may wish to read Module C-18, "Individualized Instruction". This module presents an overview of individualized instruction and discusses how a teacher might gradually individualize an existing program.

Activity: ⬆ The following items check your comprehension of the material in the Information sheet, The Module in an Individualized Program, pp. 7-15. Please explain fully, but briefly, and make sure you respond to all parts of each item.

Self-Check

1. How would you respond to a fellow teacher who stated that "there is nothing new in individualized instruction that all good vocational teachers were not already doing?"

2. Many persons who reject the use of modules in vocational education do so because they cannot accept the claim by some that modules can teach. In fact, they believe that modules lead to the dehumanization of education. (a) What role does the teacher have in an individualized program of instruction in which modules are used? (b) Why must a teacher consider modules to be directed self-instruction or tools? (c) What place does group instruction have in an individualized program?

3. In general, how do teacher education modules differ from those developed for use in local vocational programs?

4. What purpose does a module introduction serve?

5. How can module learning experiences serve to fulfill the needs of students with very different capabilities?

6. Why is it that a well developed module need not include specially developed preassessment devices?

7. How is it possible to use modules with a non-reading student in as much as the module itself is prepared to include the printed word?

Feedback: Compare your completed written responses on the Self-Check with the Model Answers given below. Your responses need not exactly duplicate the model responses; however, you should have covered the same major points.

MODEL ANSWERS

1. The teacher's statement is to be expected. The truth is that vocational teachers have always been more sensitive to the differences among students than other teachers. As a result, they naturally try to give individualized help to each of their students. However, individualized instruction goes well beyond individualized help. For instance, each student is allowed to progress along an individualized path and at a rate consistent with their unique needs, interests, abilities, and learning style. In addition, responsibility for progress is placed on the student. Students in individualized programs tend to get involved in mediated learning experiences and seldom is individual student progress compared to that of other students. Seldom does a teacher (Resource Person) function as a lecturer or discussion leader in individualized instruction. Rather, the teacher functions as a learning manager and a student helper.

2. As stated above, the teacher of an individualized instructional program functions as a learning manager and as a helper to each student. In as much as modules are not self-instructional, the learners will need help from a Resource Person to make progress in the program. Granted that some students will need less help than others, in general, all will need some help.

It seems to be well recognized that an individualized program should be complemented with some large group instructions. In effect, there are certain things that all students will hold in common. For instance their need for interaction with peers who share the same career objectives.

3. Teacher education modules tend to rely heavily on the printed word which leads to their being highly self-contained. Given the characteristics of those preparing to become teachers such is reasonable. However, modules for local level vocational education tend to rely less on the printed word and, it follows, are less self-contained. Here again, the characteristics of the users lead to these module characteristics. Since wide differences between learners are to be expected, appropriate alternatives in module mediation are necessary.

4. The introduction of a module is developed to explain the relationship of the new skill to be learned to all the skills involved in the occupation involved. In effect, it explains why learning the skill is important to learn; it is designed to motivate the learner.

5. In a module there are usually required, alternative, and optional learning experiences included. Given the differences among learners, they are always provided alternatives to each required experience. In addition, each student is given the opportunity to enrich learning through optional experiences. Naturally, an extensive use of mediated learning materials is incorporated in module learning experiences.

6. Since well developed modules provide students with criteria and standards for each objective included and essential Self-Check provisions, it is not necessary to develop other devices to preassess students. In effect, preassessment devices are already available for use.

7. Since a module makes some use of printed material, some provisions must be made for students with no ability to read. It may be necessary for the Resource Person to "walk" non-reading students through a module. However, it is possible to have experienced peer students do this or to have the total module put on audio tape. Even non-readers can profit from using modules that include a minimum amount of printed materials.

LEVEL OF PERFORMANCE: Your completed Self-Check should have covered the same major points as the model responses. If you missed some points or have questions about additional points you made, review the information sheet, The Module in an Individualized Program, pp. 7-15, or check with your Resource Person if necessary.

LEARNING EXPERIENCE II

OVERVIEW

Enabling Objective: After completing the required reading, demonstrate knowledge of the steps taken to develop a module for individualized instruction.

Activity: You will be reading the information sheet, Developing A Module, pp. 24-29.

Optional Activity: You may want to read the "Module Development Handbook" or Module Dev-101 "Develop an Instructional Module" available through your Resource Person.

Activity: You will be demonstrating knowledge of the steps taken to develop a module for individualized instruction by completing the Self-Check, pp. 30-32.

Feedback: You will be evaluating your competency by comparing your Self-Check with the model response, pp. 33-34.

Activity: This information sheet explains the step taken to develop a module for individualized instruction. Read the information sheet keeping in mind that each step explained was followed to develop this module.

DEVELOPING A MODULE

Those involved in using modules quickly learn that "you can't tell a book by its cover." Stated differently, there are great numbers of modules already developed that contain all essential components, are very well organized, and attractively packaged but have little or no value as a learning tool. Such, most frequently, results from the developers not using the proper process when developing a module. In the following sections, the sequential steps to follow are discussed:

Step 1 - Examine the Terminal Objective - the product of curriculum development is a set of Terminal Performance Objectives. The first step in the module development process would be to take one of these objectives and closely examine it.

The objective should describe the task involved (work on performance) and the conditions under which performance must occurr. In addition, the objective must state the standard that will apply to performance.

It is essential that the Terminal Performance Objective (TPO) be all inclusive (conditions, etc.) before the developer moves on in the process because the TPO is the focus for the final module learning activity. All students, no matter what their learning style or handicaps, must participate in the same final learning activity. Until students successfully complete this activity they can not be considered competent at the task involved.

Step II - Gather Information - the next step in the process is one of information gathering. The posture of the developer must be that only information relevant to the TPO is to be gathered and that the information be current.

It must be pointed out that all too often vocational teachers have been away from their occupational specialty for some period of time which could influence the validity of the information they would consider essential to task performance. For this reason, when a teacher develops a module, special care must be exercised to confirm information through up-to-date textbooks and journals. In addition, a discussion with practicing workers regarding the task involved would be very advisable.

The module developer must protect against information overload or underload. Stated differently, all related information must be gathered but that which is unrelated must be discarded. In effect, all information will fall into one of three categories: (1) essential, (2) enriching, or (3) unrelated.

Information that deals with the procedures followed to perform a task is essential. Equally essential is that which deals with the mathematic or scientific principles involved in performance. In contrast, information that has no immediate applicability to the task in question but does expand the learner's ability to perform under differing conditions, would have enrichment capabilities. Such information has value to only certain students.

A word of caution is necessary at this point. Keep in mind that there are many occupational skills that can be performed by workers who have not developed any informational base. In a sense, such workers have been trained to perform much like B. F. Skinner trained animals to effectively perform assembly line tasks. Since vocational education is not in the training business, a sound cognitive base for performance must be developed.

Step III - Develop Cognitive Learning Activities - once the developer has gathered and organized the information that students need, activities must be developed to help students learn what is needed. Unlike the final learning activity that spring from the TPO, cognitive learning activities must take into account student differences. Given such differences, there must be alternative ways for students to learn and options for students wishing enrichment experiences.

The focus of all cognitive learning activities must be the enabling performance objective. Here the task to be performed centers on something the student must do which would indicate that needed information has been learned. In addition, the conditions must be set and the standards for performance made clear. There are numerous descriptive words to describe expected learning behavior that could be used, e.g., explain, describe, etc. Preparing the task part of an Enabling Objective (EO) takes far less skill than setting conditions under which that behavior would best occur. Here the preparer's awareness of student differences is essential.

Let's imagine a group of students whose reading ability ranges from non-reader to good reader. In such a class, setting conditions for behavior that require reading ability would be fair to some but unfair to others. For this reason, alternative conditions might best be set. For instance; for some the conditions might state "after reading the information sheet----." for others they might state "after listening to the audio tape---."

Similarly, given student differences, the criteria for performance should differ. For some to "explain in writing" is sound and for others to "explain orally" makes more sense. However, the standard would remain the same.

As should be obvious, given students with differing needs, different conditions for performance are needed. It follows, therefore, that different

(alternative) learning activities would have to be developed. For instance, activities in which learning may be through reading, audio, or a combination of visual and audio. Keep in mind that a complete learning activity must fulfill the Enabling Objective in that the conditions for behavior are explained as is the performance standards.

For some students optional learning activities should also be provided. They should have the opportunity to get involved in activities that provide enrichment. Here again, alternatives may have to be offered due to personal learning styles or poor reading skills.

Step IV - Develop Simulation Activities - It is a well established fact that "practice makes perfect." Therefore, learners must have the opportunity to apply the information learned under conditions similar to those to be found in the terminal performance objectives. Perhaps the skill being learned should be performed according to reduced standards or using peer clients rather than actual clients.

The focus of a simulation activity must also be an Enabling Objective. As discussed in Step III, the conditions and standards for student performance will take into account student differences. However, the very fact that the learning experience will simulate that of the final activity suggests that learner differences will not be as great here as with cognitive activities.

Step V - Develop Introduction - The introduction to a module is supposed to provide for student motivation. Students must be informed as to what they will learn, how such relates to success in their chosen career, and how such relates to the other skills involved in their program. The introduction must be short yet be inclusive.

Step VI - Select Organizational Style - modules can be organized in different ways. They could, for example, be organized similar to this module or

similar to those used in Kentucky or North Carolina. In effect, the style used must be linear in design to have greatest utility. Other than this, style is a question of personal preference.

A linear design simply means that the user be able to start at the beginning of a module and progress sequentially to the end without a need to move back and forth within it. Such is the organizational style of this module and, therefore, its style is highly recommended. Keep in mind, however, that this module depends greatly on the printed word and thus has a high level of self-containment. Also, that this module was prepared for a task far more complex than most occupational tasks. Such, of necessity, resulted in rather long learning activities.

Step VII - Develop Directions - students must be able to use modules without consistently needing information from others as to what is to be done next. For this reason, a module should have a set of user directions. Naturally, they should be complete but they should also be stated as simply as possible. After some experience with modules, students will rely less on the directions than in the beginning but, nevertheless, each module must contain user directions.

This would be an appropriate time to also make it clear that there will be certain non-reading students that will be unable to read anything found in a module. As difficult as such a problem may appear, several solutions are possible. For instance, a non-reader could be paired with a reader when modules are used. Perhaps the teacher-Resource Person will choose to work personally with non-readers. In fact, it would be possible to put each module on an audio-tape so that non-readers can move through the module. Yes, modularized instruction does not require a student to have an inclination toward reading or any ability to do so.

Step VIII - Package Module - as stated previously, a module must be packaged. Whether that be on audio tape or in printed form it must be clearly layed out and easy to follow. If written, there should be no spelling errors included in the module and in any case no serious grammatical errors.

Step IX - Test Module - The only way for the effectiveness of a module to be judged is for it to be tested. The test must be under conditions similar to those that will prevail when the module will be used. For instance, testees must represent the student population and testing should occur within an identical program structure.

It is suggested, that no less than five tests be performed on a module to determine its effectiveness. It is further suggested, that each test involve a student with very different characteristics. Perhaps a test with a non-reader, a test with a good reader, and tests with students falling between these extremes.

When selecting testees, make sure they have no ability to perform the task and no ability to meet the Enabling Objectives. Given such a group, ability to meet the Terminal Objective after using the module would confirm the module's effectiveness. Similarly, inability to do so indicates module problems.

A discussion with each testee can go a long way toward improving any module, even those proven to be effective. Such a discussion is needed after each test and before any revisions are made.

Until a module is judged effective across five tests, it should not be considered for routine use in a program. An ineffective module serves to waste learner time and also teacher time.

Optional Activity:

For further information related to module development, you may wish to read the "Module Development Handbook" or Module Dev-101 "Develop An Instructional Module." These references describe the module development process followed at the National Center for Research in Vocational Education.

Activity:

The following items check your comprehension of the material in the information sheet, Developing a Module, pp. 24-29. Please explain fully, but briefly, and make sure you respond to all parts of each item.

SELF-CHECK

1. Why must a vocational teacher guard against using a module that was not developed properly?

2. Why is it important that modules suggest alternative and optional learning activities?

3. What purpose does a module introduction serve?

4. How does one establish module effectiveness?

Feedback: Compare your completed responses on the Self-Check with the Model Answers given below. Your responses need not exactly duplicate the model responses; however, you should have covered the same major points.

MODEL ANSWERS

1. There are many modules available that are well organized and attractively packaged that contain all essential components but do not promote student learning. Not knowing how they were developed (the process followed), vocational teachers must not use them until they themselves have progressed through the module development process and determined (through testing) that the existing modules help learners meet the Terminal Objectives involved.

2. The differences found in any group of learners suggests that their needs would be best met through offering a variety of activities rather than the same activities for all. For this reason, modules most frequently offer learners one or more alternatives to each basic learning activity and also activities which are optional. Alternative activities take into account such things as the learners' ability to profit from reading. In contrast, optional activities seek to fulfill the need of some students to enrich their learning.

3. The introduction to a module seeks to put the task to be learned in perspective. The learner is informed as to the nature of the task, why it is important to learn, and how it relates to the other tasks involved in

the occupation being learned. The introduction seeks to provide for student motivation.

4. A module should not be considered effective until it is clearly established that students that use it will meet the terminal performance objective around which the module was developed. In effect, a module is not considered fully developed until it has been tested; the last step in the module development process. It is suggested, that no less than five students be able to meet the TPO before a module be considered effective.

LEVEL OF PERFORMANCE: Your completed Self-Check should have covered the same major points as the model responses. If you missed some points or have questions about additional points you made, review the information sheet, Developing A Module, pp. 24-29, or check with your Resource Person if necessary.

LEARNING EXPERIENCE III

OVERVIEW

Enabling Objective: Given a case study describing a hypothetical teacher's first attempt at developing a module, critique that teacher's performance.

Activity: You will be reading the case study, pp. 36-38, and writing a critique of the performance of a teacher therein described.

Feedback: You will be evaluating your competency in critiquing the teachers performance at developing a module by comparing your completed critique with the model critique, p. 40.

Optional Activity: You may wish to discuss the module development process with a teacher experienced at module development or your local curriculum supervisor.

Activity: The following case study describes a teacher's first attempt to develop a module. As you read, try to place yourself "in the teacher's shoes" and consider what you would do in light of the curriculum supervisor's comments. Then prepare a written critique of what the strengths and weaknesses of the teacher's module development performance.

CASE STUDY

Mr. Bono had just returned from a meeting with Ms. Lead, his curriculum supervisor, and had mixed feelings about his involvement in preparing modules for use in his welding program. On the one hand, he was convinced that modules would help him in his efforts to individualize instruction but, on the other, he now doubted his ability to prepare modules.

Actually, he reflected, the meeting had gone very well. Ms. Lead was very supportive of his involvement and even made him feel good when she said that he was clearly the school leader in his efforts to implement individualized instruction. However, when she gave him back his first developed module, that good feeling quickly evaporated. Wow, there were red comments all over it. As he thought about it, he didn't even hear what Ms. Lead said after she gave him back the module. He just wanted to get out of her office and back to his shop to do some thinking.

Now, back in his shop, Mr. Bono knew he was faced with a big decision. Should he move forward in his efforts to develop modules or give it up as a lost cause? Being the fighter he was, he picked up the returned module and told himself that he would reserve his decision until he read each of Ms. Lead's comments. The following comments were read:

1. Joe, the module includes all essential components and is attractively layed out. You should feel a great deal of pride in having accomplished so much in your first try at developing a module.
2. Joe, I'm not sure if your introduction would provide the students with the information they might need to see how this task related to others in welding.
3. Joe, based on what you have told me about your students' reading ability, I don't see how many of them will be able to get much out of some of the learning activities you have developed. You should develop alternatives for your poor readers and consider adding some options for your better students. This would have been made clear to you had you closely followed the steps in the module development process.

You know, thought Joe Bono, things don't appear to be as glum as I thought they were. Let's go back and consider where I might have gone wrong. I started by taking a terminal performance objective and I remember taking time to make sure that it contained all essential parts. Then I did my homework by reading all I could find on the task. I even talked to several friends who routinely performed the task. Based on the information I gathered, I developed an instruction sheet for use in the cognitive learning activity. Then I designed a practice experience for the learner after which I prepared an introduction that made it clear that the task involved was done everyday by a welder and without the ability to perform it, no one could become a welder. I then decided to

make the module self-contained after which I developed directions for the user. Then I neatly packaged the module and brought it down to Ms. Lead for review.

You know, thought Joe Bono, I really don't know where I went wrong but one thing seems clear, once I find out I'll not make the same mistakes again.

Critique Mr. Bono's performance, in writing.

Feedback: Compare your written critique of the Case Study with the Model Critique given below. Your responses need not exactly duplicate the model responses; however, you should have covered the same major points.

MODEL CRITIQUE

Joe Bono should indeed be proud of himself and not doubt his ability nor discard his ambition to move his program even further toward individualization. His very first attempt at developing a module resulted in a product that was well packaged and which included all essential components. In fact, the process he followed to develop the module was very nearly perfect. There seems little doubt that a meeting with Ms. Lead will result in Joe making several revisions in the module itself and his overcoming some rather basic process problems.

For one thing, Joe will have to become more sensitive to the differences among his students and provide them with more learning activity alternatives and options. Such, of course, will result in a module much less self-contained. The important thing here is that Joe would have discovered that for himself had he completed the total module development process and tested the module with his students.

As to his introduction, Joe simply assumed too much. Even if he understood how the task in question related to other welding tasks, he shouldn't expect students to have such basic understandings. Students need more motivation that the typical "Let's do it for the Gipper" type line. Essential task or not, there's more information needed if students are to be motivated.

LEVEL OF PERFORMANCE: Your completed critique should have covered the same major points as the Model response. If you missed some points or have questions about any additional points you made, review the materials in the information sheet, Developing A Module, pp. 24-29, or check with your Resource Person if necessary.

Optional Activity: ⇨ You may wish to discuss the module development process with a teacher experienced in module development or your local Curriculum Development Specialist. The discussion could center on:

- the problems most frequently faced by inexperienced module developers
- the time and effort involved in developing modules
- the degree to which modules facilitate individualized instruction

LEARNING EXPERIENCE IV

OVERVIEW

Enabling Objective: Given a hypothetical group of students and a module, critique the module's adequacy for the group.

Activity: You will be examining information about a hypothetical group of students and, after reviewing a module, you will be critiquing the module's adequacy for the students.

Feedback: You will be evaluating your ability to critique the module's adequacy by comparing your completed critique with the model critique, pp. 52-53.

Optional Activity: You may wish to review and critique modules specifically developed for use in your occupational specialty.

Activity: Read the following information about a hypothetical group of students enrolled in a tractor mechanic program and then review the module that was developed to help the students develop competency to change the crankcase oil and filter. As you review the module, attempt to determine if the module is adequate for all the students in the program. Then prepare a written critique of the module's adequacy for the given group of students.

THE STUDENTS

1. Bob Jones: Excellent student from a farming family. Has high reading and math ability and plans to take over the family farm one day.

2. Joe Smith: Fair student from a broken family. Has some ability to read but little desire to do so. Math ability is better than average. Has no definite plans for the future and may go into the service.

3. Tim Jones: The younger brother of Bob Jones. Has almost no ability to read or do math and has no intention to work the family farm. Hoping to run his own tractor repair business.

4. Pedro Lamas: Highly motivated son of a migrant farm worker family with the desire to be a first class tractor mechanic. Speaks with a Spanish accent and has trouble reading English but understands what he hears quite well. Good math ability.

5. Mark Steel: Transfer student from out of state. Seems to have excellent reading and math ability. Currently works in his father's shop as a tractor mechanic and seems to be a very skilled mechanic already.

6. Greg Steel: Mark's younger brother who also works in his father's shop. Unlike Mark, Greg has very little ability to do math or read.

7. Pete Zeno: Fair student with good reading ability but very poor ability in math. Pete is totally deaf but hopes to find employment as a tractor mechanic.

8. Larry Long: Good student from a farming family. Hopes to work the farm with his father upon graduation. Has good ability in math and reading and doesn't feel that his loss of one arm as a 5 year old will be a serious handicap given his career goal.

9. Roger Peters: Very poor student who transferred out of welding because he couldn't keep up with the class. No ability to read or do math has always hampered his progress. Seems very interested in learning to be tractor mechanic.

THE MODULE

The module that follows was developed by the state of Kentucky. It was developed from a task listed in a V-tecs Catalog.

TRACTOR MECHANIC

CHANGING THE CRANKCASE OIL AND FILTER

Introduction

After about 100 hours of operation the oil in a tractor will be so contaminated with soot, varnish-forming materials, metal particles, water, unburned fuel, dirt, and dust that sludge will begin to develop on pistons, valve lifters, and rings. The oil filter will remove most of these particles until it becomes clogged as a result of more than 100 hours of filtering operation. This causes more sludge-forming deposits to remain suspended in the oil, causing more sludge to form on operating parts. The sludge causes excessive wear of engine parts, resulting in costly engine repairs. To avoid this trouble, the oil and filter must be changed regularly according to the manufacturer's service manual. In this module you will learn how to change the crankcase oil and oil filter.

Directions

Before you begin this module, be sure you have completed Module TM-91, "Inspecting the Lubricant Level on a Tractor."

If you have completed this module, read the two objectives below. If you think that you are already able to perform these tasks, read the Check-Out Activities on the back cover. Then either arrange with your instructor about doing the Check-Out Activities,

or

If you need to complete learning activities in order to be able to do the tasks, find the Learning Activities inside this module and go through them in the order in which they are listed.

Objective

(1) Given a wrench for the drain plug, new oil of the type and grade recommended in the manufacturer's service manual, clean rags, and a container for the old oil, change the tractor oil. When completed, the dip stick will show the oil is at (but not exceeding) the "full" mark and there will be no leaks.

(2) Given the manufacturer's service manual, a replacement filter, fresh oil and the necessary tools, change the oil filter. When finished, the filter will not leak, and the oil will be at the "full" line.

Check-Out Activities

The statements below explain the activities you must be able to complete in order to finish this module. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, CHANGING THE CRANKCASE OIL AND FILTER.

✓ Change the oil in the designated tractor.

✓ Change the oil filter on the designated tractor.

A COOPERATIVE EFFORT BETWEEN THE BUREAU OF VOCATIONAL EDUCATION, STATE DEPARTMENT OF EDUCATION AND THE DEPARTMENT OF VOCATIONAL EDUCATION, COLLEGE OF EDUCATION, UNIVERSITY OF KENTUCKY

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Learning Activities

1 → READ Tractor Maintenance: Principles and Procedures (AAVIM), pp. 29-36.

(or) _____

2 ✓ CHECK YOUR KNOWLEDGE of filter systems by taking Student Self-Check I, UNDERSTANDING OIL FILTERING SYSTEMS.

3 → VIEW slide-tape TM-92, "Changing The Crankcase Oil and Filter."

(or) _____

4 → STUDY the manufacturer's service manual to determine the location of the crankcase drain plug, fill plug, the type of oil filter required, the oil type recommended for the designated tractor, and the correct procedure for removing the oil filter from the designated tractor.

(or) _____

5 → READ Instruction Sheet I, CHANGING THE TRACTOR CRANKCASE OIL AND FILTER.

(or) _____

6 → OBSERVE another student as he or she satisfactorily performs and is checked out on this module.

(or) _____

7 → PRACTICE changing the crankcase oil and filter.

8 ✓ ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES listed on the back cover.

Instruction Sheet I

CHANGING THE TRACTOR CRANKCASE OIL AND FILTER

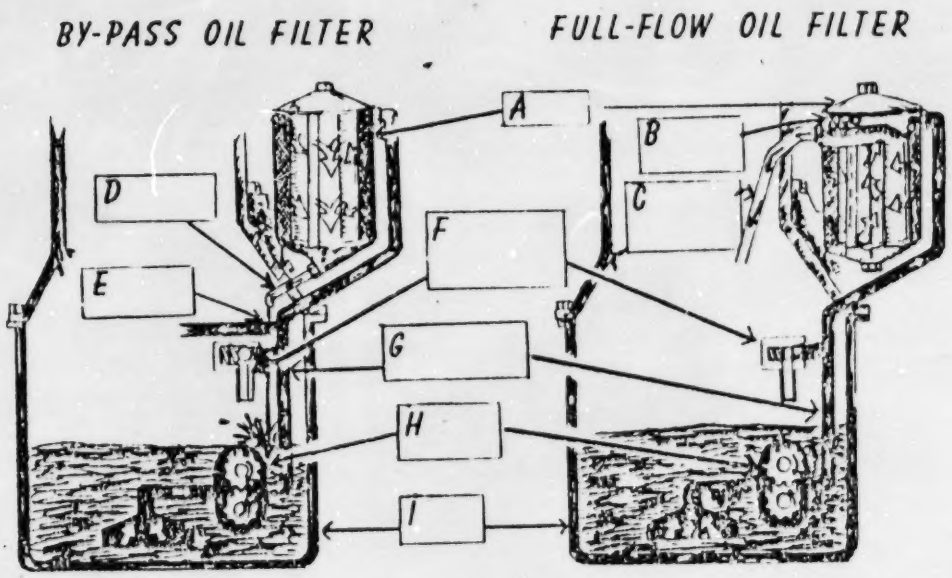
There are two basic filtration systems, by-pass and full-flow, and two basic types of filters, surface-type (spin-out) and depth-type (cartridge). Oil should be drained and replaced when new filters are installed. To change the crankcase oil and filter follow the procedure below:

1. Operate engine until normal operating temperature is reached.
2. Stop engine and disconnect coil-to-distributor wire.
3. Locate and clean around drain plugs.
4. Remove drain plug and gasket (if there is one) and clean same.
5. Allow crankcase to drain oil into a container for about 5 minutes.
6. Locate and replace oil filter according to specifications of manufacturer's service manual.
7. Replace drain plug and tighten.
8. Locate filler cap and remove, making sure no dirt enters crankcase.
9. Clean top of new oil cans and fill crankcase with new oil, specified as to amount and type in manufacturer's service manual.
10. Connect coil-to-distributor wire and start engine.
11. Operate tractor in low RPM until engine is warm.
12. Check oil pressure gauge and check for oil leaks.
13. Stop engine and check oil level, adding to "full" line if needed. (CAUTION: Do not overfill; this increases oil consumption and causes oil foaming.)
14. Store used oil in closed container.

Student Self-Check I

UNDERSTANDING OIL FILTERING SYSTEMS

1. Label the parts found on the two types of oil-filtering systems below.



a. _____ e. _____ i. _____

b. _____ f. _____

c. _____ g. _____

d. _____ h. _____

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next Learning Activity.

Correct Responses

1. a) filter, b) by-pass valve, c) filtered oil to bearings, d) filtered oil, e) oil to bearings, f) pressure regulating valve, g) unfiltered oil, h) oil pump, i) oil pan.

Student _____

Instructor's Final Checklist

CHANGING THE CRANKCASE OIL AND FILTER

Check the student's performance in the following elements of changing the crankcase oil and filter.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished, or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
In the process of changing the crankcase oil and filter, the student:				
1. Ran engine until the normal operating temperature was reached.	[ ]	[ ]	[ ]	[ ]
2. Stopped engine and disconnected coil-to-distributor wire	[ ]	[ ]	[ ]	[ ]
3. Allowed the crankcase to drain oil into a container for about 5 minutes.	[ ]	[ ]	[-]	[ ]
4. Located and replaced the oil filter according to specifications in the manufacturer's service manual.	[ ]	[ ]	[ ]	[ ]
5. Cleaned the top of the new oil cans and filled the crankcase with new oil specified in the manufacturer's service manual	[ ]	[ ]	[ ]	[ ]
6. Operated the tractor in low RPM until engine was warm.	[ ]	[ ]	[ ]	[ ]
7. Checked the oil pressure gauge and checked for oil leaks	[ ]	[ ]	[ ]	[ ]
8. Stopped the engine and checked the oil level, adding to "full" line if needed.	[ ]	[ ]	[ ]	[ ]
9. Stored the used oil in a closed container.	[ ]	[ ]	[ ]	[ ]

Critique of Module Adequacy for Given Group of Students, in writing.

Feedback: Compare your written critique of the module with the Model Critique given below. Your response need not exactly duplicate the model response; however, you should have covered the same major points.

MODEL CRITIQUE

The module is typical of many modules available to teachers in Kentucky and other states and if you had progressed through the process to develop this module you would know if it was an effective module. However, given the fact that it is probably outside your occupational specialty and that you didn't develop it, you can do little more than determine if it contains all essential components and reach certain conclusions relative to its adequacy for specific students.

You should have noticed that this module does not contain any reference to Enabling Objectives which, you should remember, provides a focus for the various learning activities. You should have noticed, in addition, that the module was highly self-contained making extensive use of the printed word. However, you should recognize the fact that the developer left space for a teacher to add learning activities which could be offered to students not being able to profit from those suggested.

Given the wide variation among the students described previously, there should have been little doubt in your mind that alternative activities would be needed for those with little or no ability or inclination to read. For such students, the module, in its present written form, would have little utility as a tool for "self-instruction". However, if provided with teacher or peer help, the student could be guided through the module. In fact, the module could have been put on audio tape for non-readers.

In general, the module, with some revision, could be made to serve the needs of the model class quite well. That assumes, of course, that it is proven effective.

LEVEL OF PERFORMANCE: Your completed critique should have covered the same major points as the model response. If you missed some points or have questions about any additional points you made, review the materials in the information sheets, Developing A Module, pp. 22-29, and The Module In An Individualized Program, pp. 7-15, or check with your Resource Person if necessary.

Optional Activity: ⇨ You may wish to review and critique modules that have been developed for use in your occupational specialty. Such modules, if available, can be located by contacting your Pennsylvania Vocational Education Information Network (Vein) located at Millersville State College. When reviewing such modules:

- consider their utility for personal use
- consider how they might be adapted for your needs
- try to determine how they might be tried out in your program

LEARNING EXPERIENCE V

FINAL EXPERIENCE

Terminal Objective:

In an actual school situation, develop a module for individualized instruction.

Activity:

Develop a module for use in the class you are responsible for teaching, this will include:

- Following the steps in the module development process.
- Producing a module which includes all essential components.
- Producing a module which is appropriately self-contained.

Note: Due to the nature of this experience, you will need a validated Terminal Performance Objective around which to develop the module and familiarity with the needs and interests of the students who would use the module.

As you complete each of the above activities, document your actions (in writing, on tape, through a log) for assessment purposes.

Feedback:

Arrange in advance to have your Resource Person review your documentation, and your completed module.

Your total competency will be assessed by your Resource Person, using the Teacher Performance Assessment Form, pp. 56-58.

Based on the criteria specified in this assessment instrument, your Resource Person will determine whether you are competent in developing a module for individualized instruction.

TEACHER PERFORMANCE ASSESSMENT FORM

Name_____

Date_____

Resource Person_____

Directions: Indicate the level of the teacher's accomplishment by placing an X in the appropriate box under the LEVEL OF PERFORMANCE heading. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

	LEVEL OF PERFORMANCE					
	N/A	NONE	POOR	FAIR	GOOD	EXCELLENT
1. In developing the module, the teacher:						
a. Examined the terminal performance objective.						
b. Gathered up-to-date information. .						
c. Developed cognitive learning activities in keeping with students' needs and interests. . . .						
d. Developed simulation learning activities provided for student practice						
e. Developed an introduction capable of providing for student motivation						
f. Selected a linear organization style.						
g. Prepared clear user directions . .						
h. Packaged all parts of the module (in writing or tape)						

	LEVEL OF PERFORMANCE					
	N/A	NONE	POOR	FAIR	GOOD	EXCELLENT
i. Tested the module.						
2. The fully developed module included:						
a. An introduction.						
b. User directions.						
c. A terminal performance objective .						
d. Two or more enabling performance objectives						
e. Alternatives for all cognitive learning activities.						
f. Optional learning activities that were enrichment offerings.						
g. Self-Checks for each Enabling Objective.						
h. Feedback for each Self-Check . . .						
i. Provisions for assessing learner task performance						
j. Provisions for feedback on performance						
k. Prerequisites, if appropriate. . .						
l. Provisions for preassessment . . .						
3. The module, after testing:						
a. Was judged as an effective tool for individualized instruction . .						
b. Was adopted for use in a program for vocational students.						

LEVEL OF PERFORMANCE: All items must receive N/A, GOOD, or EXCELLENT responses. If any item receives a NONE, POOR, or FAIR response, the teacher and Resource Person should meet to determine what additional activities the teacher needs to complete in order to reach competency in the weak area(s).